Weekly Report for 04/07/2014

Highlights

• Experimental observation of the first photo-electron beam from the newly conditioned RF gun. Over 200pC electron beam within a few ps pulse length was accelerated to ~7MeV. (Yin-e Sun)

APS Renewal and Upgrade

• Work on MOGA without errors, and with physical apertures. (Yipeng Sun)

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MCR Operations

Storage Ring Operations

• Investigated fast beam motion reported by 31-ID. Could find no bpm or corrector response which would indicate it came from the SR. Passed that information on to beamline personnel (Karen Schroeder)

• Assisted the MCR with turning beam over to Users after machine studies. (Karen Schroeder)

MCR Operations administrative/misc.

• Prepared the downtime report and either gave to Flood for presentation or presented it myself to OPS Directorate. (Karen Schroeder)

• Approved (Karen Schroeder)

APS Machine Studies

Storage Ring Studies

• Performed gap scans to updated ID Gap Feedforward tables. (Karen Schroeder)

• Assisted the MCR with non-beam related duties when there was limited personnel available. (Karen Schroeder)

• Prepared the beam related portion of the machine studies schedule and made the necessary changes to accommodate emergency non-beam requests. (Karen Schroeder)

• Conducted study with K. Harkay again examining beam loss in 6ID; this time was able to fire the IK5 pinger immediately after the MPS trigger signal. (Jeff Dooling)

• Unless the MPS can be delayed (~50-80 turns) and the IK5 pinger duration increased, firing the pinger will not protect the SCU0. (Jeff Dooling)

• Recorded beam loss event caused by the 450 power outage. MPS did not trigger until the beam was on the wall. (Jeff Dooling)

ITS Studies

• Obtained first photoelectrons from the PCGun on Thursday. Worked with Y-E. Sun to properly align UV onto PC. UV beam must come in near the top of the vacuum mirror. (Jeff Dooling)

• Measured laser IR pulsewidth using the SSA going out beyond distribution wings; seeing secondary peaks again. (Jeff Dooling)

• Measured laser uv energy in the laser room and ITS varying the uv attenuator angle. (Jeff Dooling)

• Performed one final calibration measurement of the uv energy in the ITS before buttoning up the ITS for pc gun commissioning. (Jeff Dooling)

APS Machine Research and Development

Linac Research and Development

• Worked on the APS linac PC gun front-end beamline design. Provided distance from the photocathode to the gave valve to RF group for RF waveguide installation preparation work. Modified previous beamline elements layout to use maximum existing components at APS. (Yin-e Sun)

• Talked with AWA colleague to borrow some larger (2") yag crystals for APS linac bend line spectrometer screen. (Yin-e Sun)

• Spoke with B.-X. Yang about moving the PAR streak camera to the ITS for UV bunch length measurements. (Jeff Dooling)

ITS Research and Development

• Sent 11MW RF power to the PC gun with UV drive laser turned on. However no photo-electrons was observed on the first attempt. (Yin-e Sun)

• Helped to realign the UV drive-laser to the photocathode. Using a flash light directly shining on the laser injection mirror provided an excellent view of the RF gun cathode which has never been seen so far. Moved the cathode inspection mirror all the way down on its post to zoom in on the area of interest (cathode). Aligned first the green laser to the center of the cathode, which now appears to be on the top edge of the laser injector mirror (therefore the laser injection mirror should be physically moved in the next alignment at ITS). Then aligned the UV laser to the green. Once the laser is aligned and RF back on, we observed photo-electron charges from the current transformer right away as the RF phase of L3 is adjusted. Bunch charge was 210pC which corresponds to QE of 2x10-5. We also measured bunch charge on the faraday cip at the end of the straight line. (Yin-e Sun)

• However we had trouble to get beam image on the yag crystal. Opening the YAG 1 camera iris all the way allowed us to see the defocused beam, and upon rf phasing, beam steering and focusing, we observed a tight bright beam on the straight beamline YAG screen. Beam rms size was measured, and YAG screen calibration images are taken and both screen are calibrated. (Yin-e Sun)

• Turning on the bending magnet, we saw Faraday cup signal of the bend line but again had trouble to see beam on the YAG screen. An access to the ITS to switch the remote control cable from the straight line camera to the bend line camera enabled us to open the bend line camera iris fully. (we need to be able to remote control both camera iris). Once this is done, we saw the beam spot on the spectrometer screen. Beam energy is measured to be about ~7MeV at ~120MV/m accelerating gradient on cathode. (Yin-e Sun)

APS Machine Software

Storage Ring

• discussed with Nick Sereno about ID1 gap feedforward improvement, we need control group to create new bpm offset pvs for ds and us gaps, and link the regular bpm offset pvs to ds or us based the gap status. (Hairong Shang)

Injectors

• modified the rf phase-scan program for previous linac pc gun for the new pc gun at the ITS. (Yin-e Sun)

• tested booster ramp correction software with added IRamp option, installed boosterRamp.tcl, BRampAutoCorr, BRampControlAutoCorrection and BRampControl. Now operator is able to switch booster ramp correction between VRamp and IRamp. however, IRamp seems does not work for BM, so now BM is still running with VRamp, other four magnets (QF, QD, SF, SD) are running with IRamp. (Hairong Shang)

• improved AcquireITSWaveforms 1)ivided ICTInteg by 5 since it was amplified by 5 times, 2) changed the units of ICTInteg to pC and changed the print format of parameters. 3)changed the plots for ICT current to make it look better 4) corrected the FCInteg definition. (Hairong Shang)

• added setting QF and QD trigger offset to 0 and suspending booster injection controllaw when generating booster current reference to BRampControlAutoCorrection. (Hairong Shang)

• wrote c code for compute booster IRamp RMS with PVs only, i.e., load the reference waveforms into reference PVs so that computeRMS read both current and reference data from PVs, to avoid including SDDS library in IOC, instead only imported the needed library, Ready for Shifu to put in IOC now. (Hairong Shang)

• wrote ITS phase scan script for finding the best phase that procudes the highest photon-election current and created the ITS phase scan experiment file, ready for test. (Hairong Shang)

• debugged the AcquireITSWaveforms script that it could not get the ITS gun waveguide data, it turned out that the scope was not properly triggered. Restored the proper setup for ITS gun waveguide, the data was retrieved correctly. (Hairong Shang)

General

• Demonstrated the APS elog and Fermilab electronic log book at the 1 pm group meeting. (Yin-e Sun)

• helped Yine with sddscommands for post-processing her image files (data) to find out the sigma width. (Hairong Shang)

Publications, papers and report

• On Next-Generation Storage Ring Meeting, report on updates of lattice. (Yipeng Sun)

Web Site

• Maintain Next-Generation Storage Ring Meetings wiki web site. (Yipeng Sun)

Meetings, workshops, conferences, committees, LMS related, and reviews

• reviewed a paper for Applied Physics Letter. (Yin-e Sun)

• Attended dielectric wakefield FEL meeting at AWA/ANL. (Yin-e Sun)

• Presented PC gun rf conditioning results at he group meeting. (Yin-e Sun)

• Attended shutdown planning meeting (Karen Schroeder)

Education, Mentoring and outreach

• Helped Dang Wang (graduate student at AWA/ANL) with her wake field simulation using ASTRA. Made sample files for her to test AWA wakefield. (Yin-e Sun)

Safety and Required Training

- Successfully completed (Karen Schroeder)